for additional spectrum to meet present and future public safety requirements."[30] Among its key recommendations, the Steering Committee notes that:

> It is incumbent upon Public Safety agencies to establish needs and priorities based upon their requirements, and to utilize those commercial services which fill that need. Commercial service providers need to recognize the criticality and importance placed on Public Safety communications and provide a market basket of products based on those requirements.[31]

Finally, the PSWAC Final Report devotes an entire section to the issue of public safety use of commercial wireless systems. After providing background on the issue and concluding that commercial systems offer a valuable opportunity to meet some present and expanding needs of the public safety community, the Steering Group concludes that certain minimum baseline requirements for mission critical applications are not met by any existing or planned commercial offerings. Ericsson supports these conclusions. In doing so, however, we think one additional observation may provide the Commission with increased insight.

In cases where a commercial vendor of service purchases equipment *specifically designed to meet the specialized requirements* of the public safety market, then the service provided by that vendor could be an option for public safety agencies. For example, a Specialized Mobile Radio ("SMR") operator might set aside (partition) five channels for the local sheriff, purchase public safety radio equipment, and lease the use of the five channels and equipment to the Sheriff's Department. This basic concept can be expanded to a situation where a Commercial Mobile Radio Service ("CMRS") provider builds a dedicated network from "the ground up" to serve the specialized needs of the public safety (and public service) communities. Such an arrangement

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[30] PSWAC Final Report at para. 2.1.24.

[31] PSWAC Final Report at para. 2.3.

would reduce the need for a large capital expenditure by the public safety customers of the CMRS provider and provide those customers with access to additional (commercial) spectrum. By partioning the system in software, the CMRS could benefit by leasing time to other commercial users (e.g., public service entities) and thereby capture economies of scale and scope.

With regard to the equipment and systems requirements of the public safety community, the Commission, among other things, discusses shared systems and seeks comment on the advantages and disadvantages of these types of joint-use networks. As noted earlier, the Steering Committee looked very favorably on the deployment and utilization of shared/consolidated systems and, in discussing the interoperability issue, we pointed out that such systems not only facilitate interoperability, but they also produce a host of other advantages as well. For those reasons we strongly supported the notion that the Commission as well as other Federal, state, and local officials should encourage the deployment and utilization of such systems.

To this general recommendation we would add three, more specific, observations. First, the integration of public safety networks to create joint-use or shared systems involves complex command and control issues that ultimately can only be resolved by the entities involved. For example, if the state government and the county governments do not have a strong working relationship, then it may be difficult or impossible to effectuate a shared system. As a practical matter, these issues are outside the control of the Commission. Second, the Commission currently gives no incentives to combine channels to form regional or statewide shared systems. Ericsson strongly urges the Commission to use its licensing power to create such incentives. For example, one possibility would be to classify operators of individual conventional systems as secondary while classifying operators of shared trunk systems as primary. In this way, operators

of less efficient conventional systems could continue to operate but there would be an incentive to participate in a regional or statewide system if it were available.[32] Third, the Commission's licensing processes and NTIA's authorization processes make it difficult to combine systems. Ericsson urges the Commission (and NTIA) to examine their respective processes to make it easier to combine systems serving Federal and local users.

C. Technology Issues

In the Notice, the Commission notes that, because of the specific operational needs of the public safety entities and the scarcity of the spectrum resource available to serve those needs, it is important to analyze the technologies available to public safety licensees (both currently and prospectively) in order to determine how those needs can be met in the most spectrally-efficient manner. It goes on to briefly describe four spectrally-efficient technologies currently available for voice and data transmission -- namely Time Division Multiple Access ("TDMA"), Code Division Multiple Access ("CDMA"), Frequency Division Multiple Access ("FDMA"), and an assortment of narrowband technologies, including Amplitude Compandored Single Sideband ("ACSB"). The Commission sought comments on how the use of these four technologies would address the future spectrum and capacity needs of public safety agencies. The Commission also noted that increased spectrum efficiency can be gained through greater sharing among users and through more sophisticated antenna designs as well as through the effective use of trunking. While clearly shying away from the idea of the Commission dictating the use of particular technologies, it

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[32] In a later section we also discuss exclusivity as an incentive for users to deploy and utilize more spectrally-efficient technologies. Such incentives are closely related to what is proposed here.

sought comments on the regulatory framework it should adopt to facilitate the introduction of new technologies.

As part of its deliberations, the PSWAC, through its Technology Subcommittee, developed an extensive record that identified the technologies now used by public safety agencies and identified and analyzed the emerging technologies that may serve public safety agencies' needs in the future in a spectrally-efficient manner. A key finding contained in the PSWAC Final Report is that new technologies can produce two important but counter-balancing effects in terms of public safety communications.[33] On the one hand, improvements in technology such as digital signal compression (source coding) and advanced (higher-level) modulation techniques can increase the amount of the information that can be transmitted in a given amount of spectrum (i.e., increase spectrum efficiency). On the other hand, these same technological advances can increase the features and functionality available on public safety systems allowing them to, for example, provide heretofore unavailable high-speed data and video transmission. Since the increased features and functionality can be used to meet currently unmet needs of the public safety community, the technology developments also have the counter-balancing effect of increasing the amount of spectrum required. Ericsson participated actively in the deliberations of the Technology Subcommittee and fully supports both the findings of the Technology Subcommittee and the Steering Committee as they relate to technologies currently and prospectively available to public safety entities.

With regard to the choice of a regulatory framework to guide the introduction of new technologies into the public safety arena, Ericsson agrees that it would be inappropriate and

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[33] PSWAC Final Report at para. 2.1.14.

counter-productive for the Commission to dictate any particular technologies or set of technologies. This position is based on three observations. *First*, as demonstrated throughout the PSWAC Final Report and the supporting subcommittee final reports, the wireless communications needs of public safety agencies are extremely varied in terms of unique, mission specific requirements, operating environments, and geographic coverage needs. Thus, it is highly unlikely that any single ("one size fits all") solution (or even a governmentally limited set of solutions) will adequately serve the needs of all public safety and public service entities. *Second*, telecommunications (and related areas of information) technology is changing so fast that any choice of a particular technology today is apt to be constraining rather than liberating in terms of encouraging the introduction of new, more market responsive and spectrally-efficient technologies in the future. *Third*, and fundamentally, because of the rapid pace of technology change and the varied requirements of public safety agencies, we believe that end users rather than the government (no matter how well intended) are in the best position to choose the technology that best serves their individual needs. In short, unless there is some over-arching reason to the contrary, we believe that these decisions are best left to the marketplace.

Notwithstanding the arguments made in the paragraph immediately above, we recognize that there are some special circumstances associated with the public safety community's use of the radio spectrum resource. For one thing, public safety licensees are not given exclusive use of the radio channels they utilize and, for another, they are not subject to the same marketplace forces that are associated with commercial users of the radio spectrum. The lack of exclusivity means that if a public safety agency acquires and utilizes a more spectrally-efficient system, the increase in available airtime also accrues to other users sharing the channel(s). Unless the benefits of

deploying and utilizing more spectrally-efficient technology accrue to the agency making the investment, they will have little or no incentive to acquire the system. Moreover, commercial providers of wireless services can benefit financially if they deploy and utilize more spectrally-efficient technology. For example, if a specialized mobile radio operator acquires a more spectrally-efficient system with greater capacity, he/she can profit directly by serving more customers or by selling the excess channels produced in the marketplace. On the other hand, while a public safety agency making such an investment would benefit from better performance (if it had exclusive use of the channels), it would not gain financially from doing so.

In our view, these special circumstances suggest two things in terms of the regulatory framework. First, we believe that public safety entities that adopt more spectrally-efficient technologies should be given exclusive use of the channels on which they operate. This would significantly improve the existing situation since the agency or agencies involved would receive the benefits associated with deploying and utilizing more spectrally-efficient technologies. The Steering Committee, in the PSWAC Final Report, supports the granting of exclusive channel use or "Protected Service Areas" as an incentive for advanced technologies. [34] We regard exclusivity as an important "carrot" to encourage the use of more spectrally-efficient technology by public safety agencies.

Second, because public safety licensees will not be required to pay for the spectrum they utilize and because they do not benefit directly financially through the deployment and utilization of more spectrally-efficient technologies, Ericsson recommends that public safety systems achieve

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[34] PSWAC Final Report at para. 2.2.8.

a certain minimum level of spectrum efficiency.[35] Ericsson strongly cautions against dictating narrowbanding as the only means to achieve this efficiency gain. Dictating such a program would effectively preclude public safety agencies from taking advantage of future wideband (25 kHz) features without the need for making additional large investments to purchase the additional equipment necessary to utilize wideband services. We regard the establishment of minimum levels of spectrum efficiency as a "stick" to encourage the use of more spectrally-efficient technology. We agree with the Steering Committee's finding that the current focus on narrowbanding does not provide the public safety community with the flexibility of selecting the most spectrally-efficient technology to meet their requirements.[36] Hence, we recommend that the Commission adopt a more general definition of minimum spectrum efficiency that must be acheived by public safety radio systems. More specifically, based on our analysis of the technology briefings and other material submitted to the PSWAC and our own knowledge as a leading, worldwide manufacturer of land mobile radio equipment, we recommend that the spectrum efficiency standard be set at four equivalent voice paths per existing 25 kHz channel -- i.e., a 4:1 gain in

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[35] While it is true that public safety licensees do not benefit directly financially through the deployment of more spectrally-efficient technology, this need not be the case. For example, the Commission could allow licensees to lease channels to other eligibles in the public safety service. While it is Ericsson's opinion that public safety spectrum should not be leased for commercial use, we recommend that the Commission at least consider allowing licensees to lease such spectrum for non-commerical, public safety uses.

[36] PSWAC Final Report at para. 2.2.3.

efficiency.[37] As explained in more detail in the next section, conversion to more spectrally-efficient technology may have to be accelerated in order to meet the spectrum requirements established by PSWAC.

D. Spectrum Allocation Issues

In its Notice, the Commission notes that the spectrum allocated for public safety use is highly fragmented, and it seeks comments on how the existing spectrum could be used more effectively and how additional spectrum might be provided to meet the future needs of the Public Safety Radio Service. More specifically, it asks, among other things, for commenting parties to identify current and future public safety spectrum requirements, and it identifies and seeks comments on four approaches to addressing the problems of congested spectrum and fragmented bands facing public safety agencies. These approaches include (a) allocation of additional public safety spectrum, (b) reallocation of spectrum currently assigned to the Federal government, (c) requirement for system sharing, (d) use of spectrally-efficient systems, (e) use of commercial wireless services, and (f) promotion of more efficient use of the spectrum allocated for public safety use.

Regarding current and future spectrum needs, the Spectrum Requirements Subcommittee of PSWAC inventoried current public safety spectrum allocations and constructed a realistic model for public safety spectrum needs in the year 2010. The SRSC concluded that a total of 129.3 MHz of mobile spectrum would be required by that point in time and, making allowances for existing allocations, that 93.5 MHz of *new* spectrum would be required. Of this spectrum, it

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[37] The indicated 4:1 gain in efficiency would be exclusive of any improvement in efficiency associated with shifting from conventional to trunked systems.

concluded that at least 25 MHz was required immediately to satisfy existing demands. These estimates explicitly took into account the increased spectrum efficiency that results from the use of more spectrally-efficient technology. The SRSC also determined (a) that at least 161 MHz of new point-to-point spectrum would be required to support public safety services and (b) that based on analyses conducted by the ISC, an additional 2.5 MHz of spectrum would be required to support nationwide interoperability among Federal, state, and local public safety agencies. In the PSWAC Final Report, the Steering Committee essentially agreed with these requirements for more spectrum. As in the other PSWAC activities, Ericsson participated actively in the deliberations of the SRSC and believes that the stated requirements are a reasonable estimate of the current and future spectrum needs of the public safety community. Thus, Ericsson fully supports the conclusions reached by the Steering Committee as to the current and future spectrum needs of public safety agencies.

With regard to the different approaches for providing spectrum relief, Ericsson agrees with the Steering Committee's conclusion that present shortages could be relieved in some measure by making some of the spectrum presently used for television broadcast channels 60-69 available as soon as possible.[38] Ericsson also fully supports the Steering Committee's recommendations for priority actions to assure sufficient public safety spectrum availability in the year 2010. These recommendations include both reallocations of existing Commission-controlled spectrum and the reallocation of Federal government spectrum for public safety use.

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[38] PSWAC Final Report at para. 2.2.2.1.

With regard to the remaining four approaches -- requirement for system sharing, use of spectrally-efficient systems, use of commercial wireless services, and promotion of more efficient use of the spectrum allocated for public safety use -- Ericsson offers the following comments:

First, as we explained in detail above, we strongly endorse the proposition that the Commission as well as Federal, state, and local officials should encourage the deployment and utilization of shared systems. More specifically, while we do not feel that participation in shared systems should be mandated by the Commission (nor the Executive Branch in terms of Federal government use), we believe the Commission and the Executive Branch should provide incentives for such participation because of the strong public interest benefits, including more efficient use of the scarce spectrum resource that would result.

Second, we agree that use of more spectrally-efficient systems can play a significant role in providing spectrum relief for the public safety community. Indeed, as a major manufacturer of land mobile radio systems, Ericsson is strongly committed to doing just that -- the market and public policy demand it. While we agree with the general approach used by the PSWAC in forecasting future spectrum needs -- including their assessment of the likely level of spectrum efficiencies possible by the year 2010 -- we are concerned that the PSWAC assessment is inconsistent with the rate of spectrum efficiency improvement that will occur under the FCC's current rules. Specifically, as shown in the attached appendix, a "business as usual approach" under the current rules will result in the public safety community having in place in the year 2010 radio equipment that is far less spectrally efficient than is assumed in the PSWAC analysis. Ericsson believes that the spectrum efficiency assumed by PSWAC can only be achieved by the public safety community if the FCC accelerates the shift to 6.25 kHz equivalent channel spacing

to the year 1999 and takes other steps to encourage increased spectrum efficiency in public safety mobile radio. Ericsson believes that both Ericsson and other manufacturers would be able to deliver 6.25 equivalent equipment by 1999.

Third, and again as explained in more detail above, we generally endorse the conclusions of the Steering Committee regarding the use of commercial services to provide partial spectrum relief. More specifically, we support the estimate that 10 percent of the public safety spectrum needs could be met by the use of commercial systems by the year 2010. This is the figure that was incorporated in the model used by the SRSC to forecast future spectrum needs.

Fourth, as we commented several times earlier, we agree that there is a need to promote more efficient use of the spectrum allocated for public safety use. Conceptually, this can be accomplished in two ways -- through creating positive incentives (or eliminating regulatory disincentives) for the use of more spectrally-efficient systems or by creating disincentives for use of spectrally-inefficient systems. With regard to the former, we have made several specific proposals for creating positive incentives for the deployment and utilization of more spectrally-efficient technologies and systems. These specific incentives include giving public safety entities' exclusive use of their channels if they adopt more spectrally-efficient technologies. We also advocate removing any regulatory disincentives to public safety use of trunked systems. The advantages of such systems in terms of spectrum efficiency and other benefits are now well established in both the commercial and public safety fields. Currently, however, licensing and other regulatory barriers have largely precluded the deployment of trunked systems in the Commission-controlled VHF public safety band. This is despite the fact that trunking is being used in the Federal government portion of the public safety market today. This situation is

unfortunate not only because of the diminished spectrum efficiency, but also because the VHF band has particularly desirable coverage characteristics in rural areas. This thwarting of the deployment and utilization of more spectrally-efficient trunked systems is especially unfortunate because Ericsson is aware that several public safety entities that operate existing VHF conventional systems are interested in VHF trunking. Thus, the market is being held back by uncertainties over licensing and other regulatory issues.

Consequently, Ericsson respectfully suggests that, as part of this proceeding, the Commission take the necessary steps to adjust its rules to permit trunking in the VHF band.[39] Following our earlier recommendation for creating incentives for such conversions, we further suggest that the Commission offer exclusivity or a protected service area for public safety users who make the conversion to the more spectrally-efficient trunked technology.[40]

With regard to creating disincentives for the use of spectrally-inefficient systems, we have already argued that, because public safety licensees will not be required to pay for the spectrum they utilize and because they do not benefit directly financially from the deployment and utilization of more spectrally-efficient systems, the Commission should adopt a specific, minimum spectrum efficiency standard for public safety systems. Because the minimum standard of spectrum efficiency does not include the positive effects of trunking, and because rapid technological trends

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[39] While the arguments for adjusting the Commissions rules to permit trunking have been couched in terms of the VHF band, the arguments apply equally as well to the UHF band.

[40] Although it may lie outside the scope of this proceeding, Ericsson also suggests that exclusivity be granted to non-public safety users who also make the conversion to the more spectrally-efficient trunked technology in the VHF and UHF bands. This would provide the necessary incentives for commercial operators of trunked systems in these two bands to serve some of the needs of public safety and public service entities.

could, conceivably, make even the 4:1 improvement obsolete, Ericsson recommends that the Commission adopt a rule that proscribes a public safety agency from *a priori* preventing a potential provider of public safety systems from proposing a more spectrally-efficient technology in response to a procurement activity. Thus, a procuring agency or group of agencies could establish performance standards (say in terms of voice quality, call set up time, or blocking probablity) but they could not preclude a supplier, for example, from proposing a trunked system or a system that created more voice channels per unit of bandwidth. Under our proposed rules, if the procuring entity rejects the more spectrally-efficient technology, it would be required to notify the Commission of this fact and also summarize its reasons for doing so (i.e., the proposed supplier's failure to meet technology-neutral performance standards).[41] In this way, the public safety entity would be free to choose the system that best met their needs while giving the Commission assurance that the spectrum is being used efficiently.

E. Transition Issues

In the Notice, the Commission states that, in order to address the deficiencies of public safety communications, it must not only facilitate the development of feature-rich, spectrally-efficient communications systems, but also provide for a smooth transition from today's environment to one in which public safety agencies employ these advanced technologies. It also tentatively concludes, for several reasons, that a transition strategy that rests principally on obtaining new spectrum for public safety is unacceptable because it effectively would ignore public safety's more immediate requirements. It specifically asks for comments on transition

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[41] In order to reduce the regulatory burden of such rules, the requirement could be limited to systems in major urban areas where spectrum congestion is most severe and/or by size of the system procurement.

alternatives including (1) increasing the use of commercial services, (2) funding for the migration, and (3) improving public safety spectrum administration.

With regard to the first alternative, we have already commented extensively on the potential role of commercial services and there is no need to repeat those comments here. With regard to funding for the migration, the Commission notes that it believes that funding is a substantial obstacle to the migration of public safety users to advanced systems and the PSWAC Final Report substantiates that opinion. The Commission suggests one specific option under which public safety users would migrate from existing systems and the vacant spectrum would then be auctioned. Under the Commission's proposal, the auction proceeds could then be used to underwrite the migration of incumbent public safety entities to new frequencies. Unfortunately, it does not appear that such a migration is practical or desirable. It is not practical because it does not appear that there is sufficient spectrum available for public safety users to migrate out of their existing spectrum allocations. It is not desirable because of the different coverage characteristics of the various bands and the importance of those differences to meeting the coverage requirements of different public safety agencies.

Finally, with regard to the third alternative, the PSWAC Final Report contains a number of suggestions for improving public safety spectrum administration. In particular, the Steering Committee (a) supports block allocations of spectrum for public safety use, (b) recommends the Commission pursue the development of a public safety management structure, and (c) agrees with a flexible regulatory environment that encourages the development of shared systems. It also recommends that, as the role of the PSWAC subsides, a follow-up effort be continued to give

advice and counsel to the Commission and to NTIA with regards to public safety wireless communications. Ericsson agrees with these suggestions.

F. Competition Issues

As noted in Section I, above, in its Notice, the Commission also sought comments on competitive issues associated with the supply of public safety goods and services. In doing so, it expressed the belief that a "contributing factor to the deficiencies in today's public safety communications is the lack of a vigorous competitive market for the purchase of communications equipment and services employed by public safety agencies."[42] The Commission went on to reiterate that "the Commission's goal in this proceeding, as in others, is to create a regulatory environment which fosters competition."[43] Subsequent to its Notice, in a Public Notice dated October 9, 1996, the Commission sought additional comments in the instant proceeding relating to the development of standards for public safety wireless communications equipment.[44]

Ericsson shares the Commission's concerns about the structure and performance of the public safety segment of the land mobile radio market. As stated in Section I, Ericsson expressed these concerns early in the Advisory Committee process in a letter to the Chairman of PSWAC dated October 24, 1995. The concerns expressed in that letter were based, in part, on a then on-going study by Hatfield Associates, Inc. ("HAI").

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[42] Notice at para. 95.

[43] Notice at para. 97.

[44] *Additional Comment Sought on Non-accredited Standard-setting Organizations That Develop Standards for Public Safety Wireless Communications Equipment,* Public Notice, FCC 96-403, released October 9, 1996 ("Public Notice").

Subsequent to sending this letter, initial steps were taken in the PSWAC subcommittee process towards (a) having the Advisory Committee recommend a baseline technology for a common mode of interoperability to be mandatory in all public safety radios and (b) having the APCO Project 25 specification be the recommended standard for that baseline technology. Consequently, on January 16, 1996, Ericsson wrote a second letter to the Chairman of PSWAC enclosing a copy of the completed study by HAI[45] and expressing concerns about the competitive consequences of relying on the APCO Project 25 specification as the baseline standard for interoperability. We supported our concerns in that letter by quoting the following passage from the HAI study:

> ...we have concluded that the public safety dispatch communications equipment market constitutes a separate and distinct market and that the market is highly concentrated and dominated by a single firm, Motorola. We have further concluded that, because of the complexity and opaqueness of the process, the plethora of problems that economists associate with a situation wherein a firm with dominant market power is in a position to influence standards, and strong evidence that the process actually produced a flawed result, the Advisory Committee should be very wary of relying upon the results of the APCO Project 25 in its deliberations.

The proposal to adopt the APCO Project 25 as a baseline technology for a common mode of interoperability was not adopted and, instead, as reported in Section II.A.4, the ISC adopted 25 kHz analog FM (with later migration to 12.5 kHz analog FM) as a recommended common mode of interoperability. As stated earlier, Ericsson strongly endorses the ISC recommendations for the use of analog FM as the common mode of operation for achieving enhanced interoperability for a host of important reasons. Among these reasons is the pro-competitive consequences of relying

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[45] Hatfield Associates, Inc., "Competitive Considerations Associated with APCO Project 25," dated January 5, 1996.

on a robust technology that is widely understood and available to a wide variety of manufacturers and unencumbered by Intellectual Property Rights issues.

The issue of a common mode of operation arose again in the more recent deliberations of the ISC and in the deliberations of the Steering Committee itself. Specifically, the Steering Committee, reflecting the work of the ISC, has suggested that a group comprised of experts from government, industry and users be organized to examine a baseline interoperability requirement in the evolving digital environment. Little specifics on the organization, composition, and charter of the proposed group were provided. Ericsson, as stated earlier, agrees with the need for continuing efforts relating to achieving interoperability in the digital environment, but we have significant concerns about potential anti-competitive consequences if the *process* of establishing the baseline technology is not properly designed. Generally speaking, our concerns stem from the plethora of economic effects that reduce social welfare when firms with dominant market power and/or strong Intellectual Property Rights are in a position to unduly influence a standards-setting process. The specific reasons for our concerns are expressed below.

One reason we are concerned (and why we think the Commission should be concerned) is that evidence produced by the PSWAC supports the conclusions of the HAI study to the effect that (a) the existing public safety communications equipment market is a separate and distinct market because of the specialized needs of the public safety community and (b) the unique operational requirements of that community significantly limit their ability to rely on commercial service offerings in satisfying their needs.

Another reason we are concerned is that past efforts of the public safety community to set standards have led to flawed results. As explained in more detail in the HAI study, a previous

effort entitled APCO Project 16 led to a Motorola oriented functional/performance specification for analog trunked radio systems. According to the HAI study, "Motorola refused to license its proprietary trunked radio system protocol to General Electric Company ("GE") and, consequently, was the only manufacturer of APCO Project 16 compliant dispatch systems for approximately six years."[46] Likewise, the more recent efforts by APCO to develop and promulgate standards for the next generation of digital public safety communications equipment has led to a specification (APCO Project 25) that relies on Motorola advocated and controlled technology and produced allegations and disputes that call into question the overall fairness and objectivity of the process that led to the selection of the specification. As pointed out in the HAI study, the fundamental flaws in the process are best illustrated by the fact that, despite the APCO Project 25 stated purpose of ensuring and promoting competitive procurement, no new, established manufacturer of land mobile radio equipment has entered the public safety market as a result of the adoption of the APCO Project 25 specification.

We believe that these reasons, coupled with the fact that the public safety equipment market remains highly concentrated and dominated by a single firm with strong Intellectual Property Rights, suggest the need for special regulatory steps by the Commission to prevent potential abuse of the standards-setting process.

In its Public Notice relating to the development of standards for public safety wireless communications equipment, the Commission noted that Section 273(d)(4) of the Communications Act establishes procedural and other requirements that certain non-accredited entities must follow

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[46] Hatfield Associates, Inc., "Competitive Considerations Associated with APCO Project 25," dated January 5, 1996, p. 10.

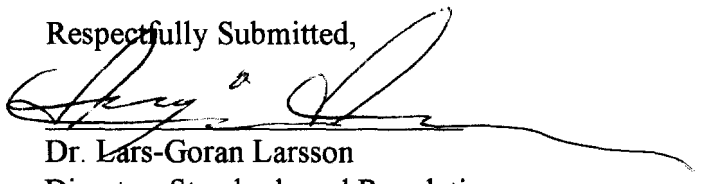
if they develop industry-wide telecommunications standards or generic network equipment requirements. The Commission went on to state that, while it did not believe that the requirements of Section 273(d)(4) applied to public safety wireless communications equipment, it inquired as to whether the general principles articulated therein should be applied to the development and adoption of future standards for public safety wireless equipment and systems. It also sought comments on whether the Commission has the authority to impose similar requirements in the area.

Section 273(b)(4) was added to the Communications Act of 1934 ("the Act") through the passage of the Telecommunications Act of 1996. In adding this and related provisions to the Act, the Congress was grappling with competitive issues associated with permitting the Bell Operating Companies to manufacture telecommunications equipment. The concerns raised during the Congressional deliberations on the Telecommunications Act of 1996 which resulted in Section 273(d)(4) are analogous to the concerns raised here about the public safety wireless communications market, namely the ability of a firm with dominant market power to unfairly influence the standards-setting process to the detriment of competition. Both the current economic structure and performance of the public safety segment of the land mobile radio market and the documented problems associated with previous standards-setting activities in the industry and market segments, demand that this issue be addressed. Furthermore, the historic procurement processes in this industry and market segment provide additional evidence that inaction will be very detrimental. The Commission must recognize public safety wireless standards can be "de facto" adopted, even though no affirmative steps are taken, simply through the exercise of buyer power. This market being one that is dominated by a firm with the power to influence the

standards-setting process for its commercial gain, is particularly susceptible to such "de facto" adoption of standards. Such standards may not produce maximum benefit for public safety wireless communications. Ericsson believes the Commission has a duty to minimize the potential damage to public safety wireless communications. Ericsson strongly recommends that the Commission require any future effort to establish a baseline technology be conducted by an accredited standards-setting organization. If, however, a non-accredited standards-setting organization attempts to establish standards, Ericsson strongly recommends such organization be required to follow and comply with the principles set forth in Section 273(d)(4) of the Communications Act of 1934 as amended by the Telecommunications Act of 1996. Ericsson fully understands these minimal requirements may be insufficient to prevent the standard-setting problems that have occurred in the past, but one thing is painfully clear -- the standards-setting process cannot continue in a totally unregulated manner if the public safety wireless communications needs of the future are to be met.

Ericsson believes that ensuring a fair and open standards-setting process is not only essential for a more competitive public safety communications market with lower prices and more advanced features and functions, but it is also essential for allowing Ericsson and other manufacturers to develop and market even more spectrally-efficient public safety systems in the future. Continuing to improve spectral efficiency in public safety communications systems will not only ensure that future public safety wireless communications capacity requirements are met, but will also ensure that the valuable spectrum resource dedicated to public safety is not wasted.

Respectfully Submitted,



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Appendix

Market Feasibility of PSWAC's Spectrum Efficiency Assumptions

PSWAC's spectrum needs forecasts are based upon a methodology which separately estimates the demand (e.g. voice conversations in the Los Angeles urban area) and the spectrum efficiency (e.g, kHz of bandwidth required per active voice conversation) and then combines these estimates to generate overall estimates of spectrum demand.

PSWAC's forecasts for voice communications bandwidth needs are based upon a technology forecast that looks to an average embedded public safety communications plant in 2010 that is six times as efficient as the average systems installed today. That is, the forecast is that the **average** public safety system in 2010 will be able to carry a voice signal in only 4 kHz of spectrum in contrast to today's systems which use 25 or 30 kHz of spectrum to carry a voice signal.[1] The forecast for the state-of-the-art in 2010 is even higher — but it is the spectrum efficiency of the average system that relates to the total spectrum needed.

Public safety systems can be divided into two separate subsystems — the mobile and portable equipment and the fixed infrastructure. Mobile equipment tends to last less than a decade in the field. The combination of physical wear and tear, loss, and technological innovation causes such equipment to be replaced after five to ten years. The situation for the fixed infrastructure is quite different. Fixed gear is not subject to the same kinds of physical stress as are portables and fixed gear is much less likely to be lost or stolen. Public safety agencies do upgrade and replace their fixed infrastructure from time to time. Ericsson believes that the

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[1] The PSWAC model also assumed that the average channel would be as productive as a channel in a 20-channel trunked system and that geographic reuse of public safety frequencies would be improved over today's practice.

average life of such fixed infrastructure lies in the 15 to 20 year range.[2] Thus, equipment is being installed today that will still be operational in the year 2010. Equipment installed in the next few years limits the possible spectrum efficiencies that can be obtained by the year 2010.

A simple example will show how today's investments can constrain the possible spectrum efficiency in 2010. Make the following conservative assumption:

- The average public safety communications system infrastructure is replaced every 15 years (the real-world replacement rate is probably slower than this),
- All new systems being installed today acheive the 12.5 kHz equivalent spectrum efficiency (in the real-world people are still installing 25 kHz equivalent systems),
- Growth in demand for public safety communications occurs evenly in all agencies (that is, growth is spread out evenly, it isn't all concentrated in new systems), and
- PSWAC's forecasts for communications needs are correct.

Then after five years pass (1997-2002), a third of all public safety communications systems operate with a spectrum efficiency of 12.5 kHz per active speech path. Of course, these systems would be new and would not have reached the end of their useful life by the year 2010. In the year 2010, they will still constitute a third of all public safety communications systems. Their contribution to the average spectrum efficiency of public safety communications will be (1/3)*12.5 kHz = 4.2 kHz. That is, these older radios (making up only one-third of public safety radios) will consume more spectrum than PSWAC forecast that all public safety voice radios would require. If the other two-thirds of the radios only required 3 kHz per active speech path,

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[2] We note that the PSWAC Technology Subcommittee stated "Analog equipment with 10 to 20 year lifetimes will continue to be installed for several years." PSWAC Report, Appendix B, page 77 (272).

then the average radio would require (1/3)*12.5+(2/3)*3 = 6.2 kHz — more than fifty percent greater than PSWAC assumed. The PSWAC technology forecast can be achieved if more efficient radios are installed in the short run (that is, if we do not spend five years installing relatively inefficient radios) or if public safety agencies accelerate their purchase of infrastructure equipment (that is, if public safety agencies are willing to replace the base stations they bought in 2002 by 2010).[3] Ericsson is not suggesting that this latter solution is either possible (local jurisdictions just don't have the money to replace working radio systems) or sound public policy. Rather, a more rapid implementation of spectrum efficient technology is required.

If the timetable of the FCC's current refarming rules is followed, manufacturers will not be restricted to type-acceptance of radios with 6.25 kHz equivalent efficiencies until 2005. If the public safety community waits until 2005 before shifting to the use of 6.25 kHz equivalent technology in all systems that are upgrading the average spectrum efficiency in 2010 will be less than half that assumed in the PSWAC analysis and, other things being equal, either twice as much spectrum will be needed for public safety voice communications needs or significant public safety needs will go unmet.

We have developed simple computer models that show that accelerating the transition to 6.25 kHz equivalent technologies substantially improves the average spectrum efficiency of public safety radio systems in the year 2010. But, quantitative modeling is not really necessary here. It

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[3] Ericsson believes that the underlying technical assumptions of the PSWAC spectrum model are reasonable, but that actually deploying such technology poses a significant challenge. Ericsson notes that the technical assumptions of the PSWAC analysis were properly conservative — in the sense that they minimized the estimate of required public safety spectrum.

is clear that a business as usual approach to spectrum efficiency will not acheive the spectrum efficiencies underlying the PSWAC analysis.

To acheive the spectrum efficiency underlying the PSWAC analysis, the FCC must take two steps. First, the Commission must accelerate the transition to 6.25 kHz equivalent technology to no later than 1999. Second, even after 1999, the Commission must continue to require manufacturers and users to develop and deploy more spectrum efficient technologies.